

Unit 2

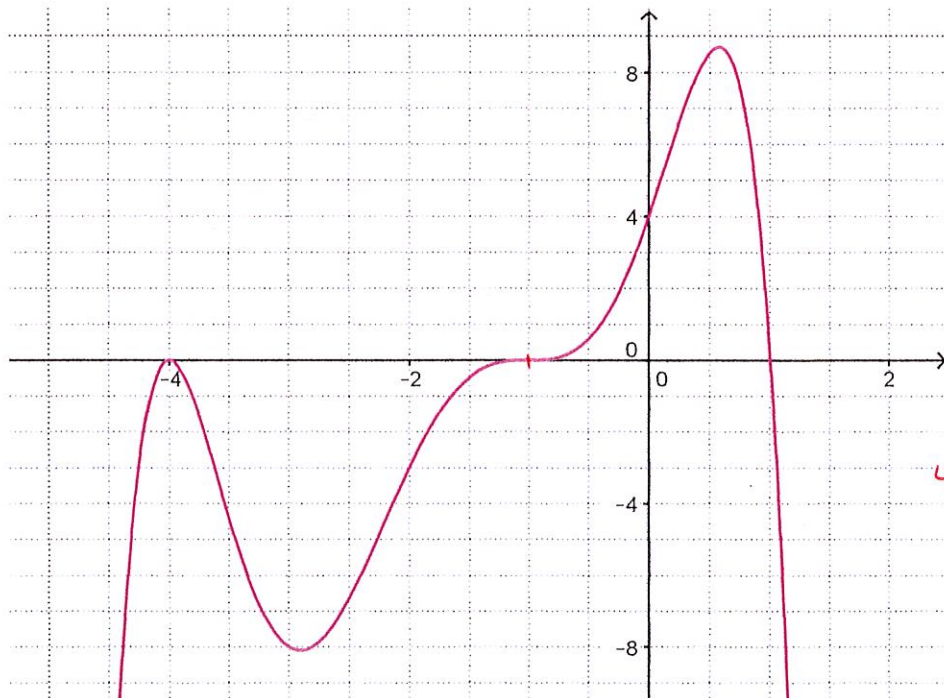
Review Warm-up "Pop Quiz"

Finding Equations of Polynomial and Rational Functions

Name _____

Identify intercepts, end behavior, asymptotes, and domain and write an equation for each function.

1.



EB $\downarrow\downarrow$
 $a_n < 0$, n even

$(x+4)$ bounce

$(x+1)$ cubic

$(x-1)$ cross

y.i = 4

D: $(-\infty, \infty)$

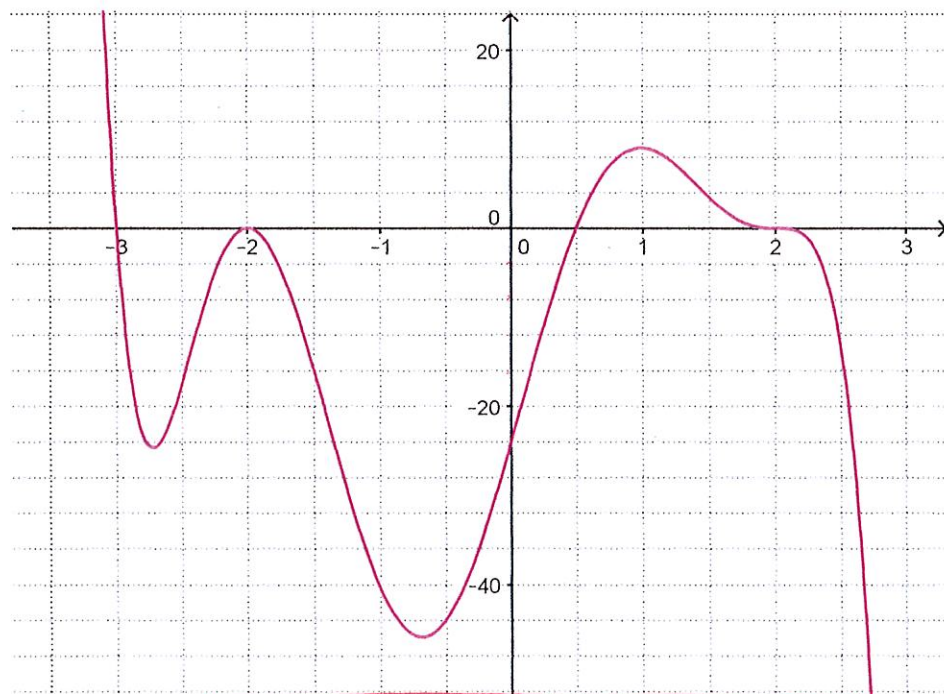
$$4 = a(x+4)^2(x+1)^3(x-1)$$

$$4 = a(16)(1)(-1)$$

$$a = -\frac{1}{4}$$

$$\boxed{-\frac{1}{4}(x+4)^2(x+1)^3(x-1)}$$

2.



EB up, down

$a_n < 0$, n odd

$(x+3)$ cross

$(x+2)$ bounce

y.i @ -24

$(2x-1)$ cross

$(x-2)$ cubic

$$-24 = A(x+3)(x+2)^2\left(\frac{x-1}{2}\right)(x-2)^3$$

$$-24 = A(3)(4)(-1)(-8)$$

$$-24 = A(96)48$$

$$A = \frac{-24}{48} = -\frac{1}{2}$$

$$\boxed{y = -\frac{1}{2}(x+3)(x+2)^2\left(x-\frac{1}{2}\right)(x-2)^3}$$

Pre Calculus Honors

Name:

Date:

Bringing It All Together - Polynomials and Rational Review

Complete on separate paper.

- 1) What type of discontinuity is in each graph? How do you know?
~~1) Guess as to what you think that the equation is for the following two sets of data.~~

A.

x	y
2.7	12.1
2.9	101
2.95	401
3	UNDEF
3.05	401
3.1	101
3.3	12.1

B.

x	y
1.5	-1.5
1.9	-9.5
1.95	-19.5
2	UNDEF
2.05	20.5
2.1	10.5
2.5	2.5

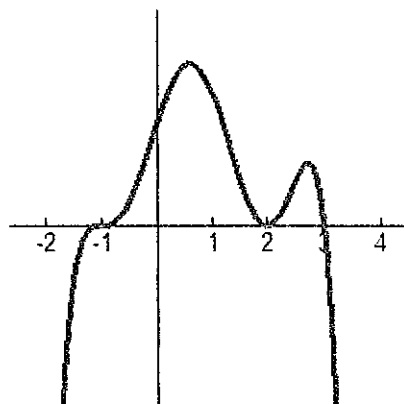
- 2) Sketch a graph of the following, labeling x- and y-intercepts, coordinates of holes and equations of any vertical or horizontal asymptotes.

a) $f(x) = \frac{(2x-6)(x+5)}{(x+5)(x-4)}$

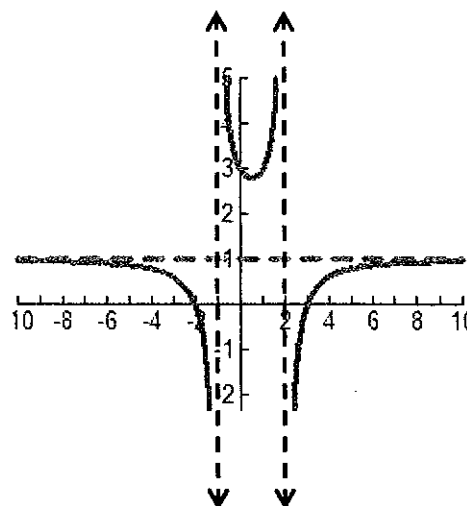
b) $f(x) = \frac{(2x-6)(x+5)}{(x+5)(x-4)^2}$

- 4) Give a possible equation for the following graphs:

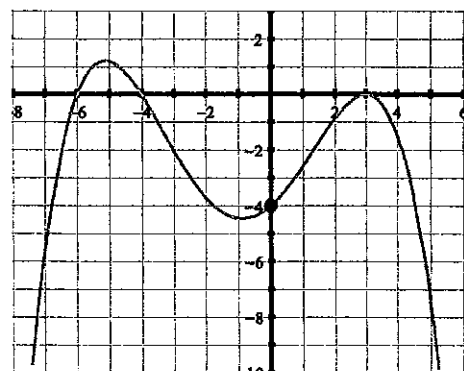
a)



b)



- c) The polynomial contains the point (0,4)



5) Find a possible formula for the following rational or polynomial functions (might be helpful to sketch a graph in order to guide you).

- a) The graph of $y=h(x)$ has two vertical asymptotes: one at $x=-2$ and one at $x=3$. It has a horizontal asymptote of $y=1$. The graph of h touches the x -axis once at $x=5$.
- b) This 5th degree polynomial has x -intercepts at $x=-3$, $x=2$, and $x=5$, and at $x=6$. ~~It has a y -intercept of 7.~~
- c) This function has zeros (x -intercepts) at $x=-3$ and $x=2$, and vertical asymptotes at $x=-5$ and $x=7$. It has a horizontal asymptote of $y=1$.
- d) This function has zeros at $x=2$ and $x=3$. It has a vertical asymptote $x=5$. It has a horizontal asymptote of $y=-3$.

6) Without a calculator, use the functions described below to match i-vi with descriptors a-f. Some of the descriptions may have no matching function or more than one function matching function. For the first one, I've given you a hint to help you get started.

$$f(x) = (x-3)^2$$

$$g(x) = x^2 - 4$$

$$h(x) = x + 1$$

$$j(x) = x^2 + 1$$

$$(i) p(x) = \frac{f(x)}{g(x)} = \frac{(x-3)^2}{x^2 - 4}$$

$$(ii) q(x) = \frac{h(x)}{g(x)}$$

$$(iii) r(x) = f(x) \cdot g(x)$$

$$(iv) s(x) = \frac{g(x)}{j(x)}$$

$$(v) t(x) = \frac{1}{h(x)}$$

$$(vi) \frac{j(x)}{f(x)}$$

- (a) I have Two zeros, no vertical asymptotes, and a horizontal asymptote.
- (b) I have Two zeros, no vertical asymptote, and no horizontal asymptote.
- (c) I have One zero, one vertical asymptote, and a horizontal asymptote.
- (d) I have One zero, two vertical asymptotes, and a horizontal asymptote.
- (e) I have No zeros, one vertical asymptote, and a horizontal asymptote at $y=1$.
- (f) I have No zeros, one vertical asymptote, and a horizontal asymptote at $y=0$.

Bringing It All Together - Polynomials and Rational Review

1) ~~Guess as to what you think that the equation is for the following two sets of data.~~

$$\frac{(x-3)}{(x-3)}$$

x	y
2.7	12.1
2.9	101
2.95	401
3	UNDEF
3.05	401
3.1	101
3.3	12.1

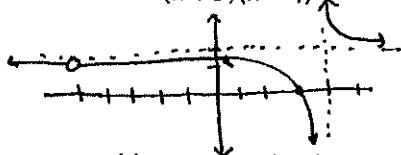
Hole

x	y
1.5	-1.5
1.9	-9.5
1.95	-19.5
2	UNDEF
2.05	20.5
2.1	10.5
2.5	2.5

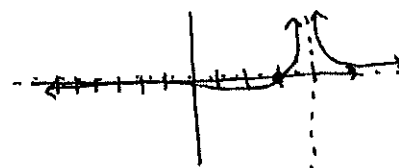
Vertical Asymptote

2) Sketch a graph of the following, labeling x- and y-intercepts, coordinates of holes and equations of any vertical or horizontal asymptotes.

a) $f(x) = \frac{(2x-6)(x+5)}{(x+5)(x-4)}$

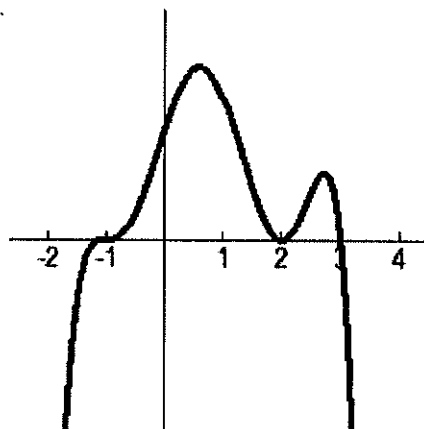


b) $f(x) = \frac{(2x-6)(x+5)}{(x+5)(x-4)^2}$



4) Give a possible equation for the following graphs:

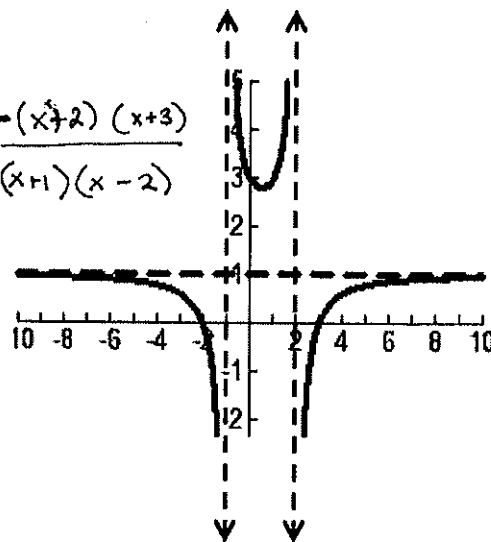
a)



$$f(x) = (x+1)^3(x-2)^2(x-3)$$

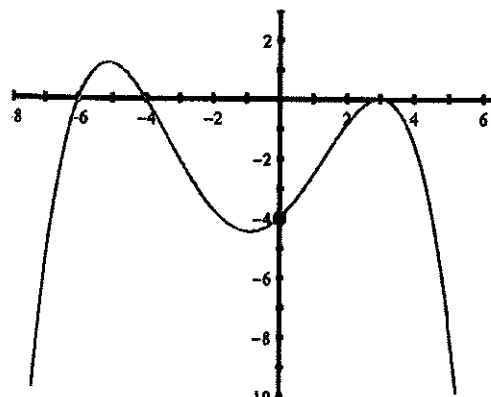
b)

$$f(x) = \frac{-(x^2+2)(x+3)}{(x+1)(x-2)}$$



c) The polynomial contains the point (0,4)

$$f(x) = \frac{-1}{54}(x+6)(x+4)(x-3)^2$$



5) Find a possible formula for the following rational or polynomial functions (might be helpful to sketch a graph in order to guide you).

- a) The graph of $y=h(x)$ has two vertical asymptotes: one at $x=-2$ and one at $x=3$. It has a horizontal asymptote of $y=1$. The graph of h touches the x -axis once at $x=5$.

$$h(x) = \frac{(x-5)(x-5)}{(x+2)(x-3)} = \frac{(x-5)^2}{(x+2)(x-3)}$$

- b) This 5th degree polynomial has x -intercepts at $x=-3$, $x=2$, and $x=5$, and at $x=6$. It has a y -intercept of -7 .

$$f(x) = -(x+3)^2(x-2)(x-5)(x-6)$$

- c) This function has zeros (x -intercepts) at $x=-3$ and $x=2$, and vertical asymptotes at $x=5$ and $x=7$. It has a horizontal asymptote of $y=1$.

$$f(x) = \frac{(x+3)(x-2)}{(x-5)(x-7)}$$

- d) This function has zeros at $x=2$ and $x=3$. It has a vertical asymptote $x=5$. It has a horizontal asymptote of $y=3$.

$$\frac{-3(x-2)(x-3)}{(x-5)^2}$$

6) Without a calculator, use the functions described below to match i-vi with descriptors a-f. Some of the descriptions may have no matching function or more than one function matching function. For the first one, I've given you a hint to help you get started.

$$f(x) = (x-3)^2$$

$$g(x) = x^2 - 4$$

$$h(x) = x + 1$$

$$j(x) = x^2 + 1$$

(i) $p(x) = \frac{f(x)}{g(x)} = \frac{(x-3)^2}{x^2-4}$ **D.** (ii) $q(x) = \frac{h(x)}{g(x)} = \frac{x+1}{(x+2)(x-2)}$ **D.** (iii) $r(x) = f(x) \cdot g(x) = (x-3)^2(x+2)(x-2)$ **no match.**

(iv) $s(x) = \frac{g(x)}{j(x)} = \frac{(x+2)(x-2)}{x^2+1}$ **A.** (v) $t(x) = \frac{1}{h(x)} = \frac{1}{x+1}$ **F.** (vi) $\frac{j(x)}{f(x)} = \frac{x^2+1}{(x-3)^2}$ **E.**

- (a) I have Two zeros, no vertical asymptotes, and a horizontal asymptote.
- (b) I have Two zeros, no vertical asymptote, and no horizontal asymptote.
- (c) I have One zero, one vertical asymptote, and a horizontal asymptote.
- (d) I have One zero, two vertical asymptotes, and a horizontal asymptote.
- (e) I have No zeros, one vertical asymptote, and a horizontal asymptote at $y=1$.
- (f) I have No zeros, one vertical asymptote, and a horizontal asymptote at $y=0$.